

RECEIVED

APR 11 2003
TECH CENTER 1600/2900

1600

RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/701,747A

DATE: 04/11/2003

TIME: 09:42:30

Input Set : A:\seq lsit .txt

Output Set: N:\CRF4\04112003\I701747A.raw

4 <110> APPLICANT: Wood, John N
 5 England, Steven
 6 Chen, Chih C
 7 Akopian, Armen N
 9 <120> TITLE OF INVENTION: Ion channels
 11 <130> FILE REFERENCE: 620-123
 13 <140> CURRENT APPLICATION NUMBER: US 09/701,747A
 14 <141> CURRENT FILING DATE: 2000-12-04
 16 <150> PRIOR APPLICATION NUMBER: PCT/GB99/01743
 17 <151> PRIOR FILING DATE: 1999-06-03
 19 <150> PRIOR APPLICATION NUMBER: GB 9811965.4
 20 <151> PRIOR FILING DATE: 1998-06-03
 22 <160> NUMBER OF SEQ ID NOS: 13
 24 <170> SOFTWARE: PatentIn Ver. 2.1
 26 <210> SEQ ID NO: 1
 27 <211> LENGTH: 2622
 28 <212> TYPE: DNA
 29 <213> ORGANISM: Rattus norvegicus
 31 <220> FEATURE:
 32 <221> NAME/KEY: misc_feature
 33 <222> LOCATION: 2139, 2203, 2253, 2313, 2316, 2428, 2482, 2516, 2532
 34 <223> OTHER INFORMATION: n is unknown
 36 <220> FEATURE:
 37 <221> NAME/KEY: misc_feature
 38 <222> LOCATION: 2546, 2563, 2584, 2594
 39 <223> OTHER INFORMATION: n is unknown
 41 <400> SEQUENCE: 1
 42 agtgacagct gtgcgggtgc tgataaggga agccacaagg agacgatcga ggagagagac 60
 43 aagcggcagc agaggcagca gcgacagatg cagcgccggg gctgcggagc tgctgggagt 120
 44 gggagtgacg ccccccacctc ggccccccac cctgtcccca tcctcctcct ggttgccctg 180
 45 agtttagaag agcagccgct gccaccacca ccaactccga gggcaccagg gctgctgtcc 240
 46 aggggaaggag agtagcagtg aggcctctggc cagtcgccagc agccggggac agatgccgat 300
 47 cgagattgtg tgcaaaatca aatttgctga ggaggatgca aaaccaagg agaaggaggc 360
 48 aggggatgag cagagcctcc tgggggctgc tcaggggccca gcagcccctc gggacctggc 420
 49 tacctttgcc agcaccagta ctctgcatgg gctggggccg gcctgtggcc caggccccca 480
 50 tggactgcgc agaaccctgt ggggtactggc cctactcacc tcaactggctg ccttcctgta 540
 51 ccaggcagcc agcctggcca ggggctacct gaccgggcct cacctggtag ccatggacct 600
 52 tgctgccccca gccccagtgg cgggctttcc ggctgtcacc ctctgcaaca tcaaccgctt 660
 53 ccggcattcg gcaactcagc atgctgatat ctccacctg gccaatctga cagggtgctc 720
 54 ccccaaagac cgggatgggc accgtgcagc tggccttcgc taccagagc ctgacatggt 780
 55 agacatcctc aaccgcaact gccaccagct tgctgacatg ctcaagagct gcaacttcag 840
 56 tgggcaccac tgctccgcca gcaacttctc tgtggtctat actcgctatg gaaagtgtta 900
 57 caccttcaat gcagatcctc agagttcact gccagcagg gcaggcggca tgggtagtgg 960

P.6
ENTERED

RAW SEQUENCE LISTING

DATE: 04/11/2003

PATENT APPLICATION: US/09/701,747A

TIME: 09:42:30

Input Set : A:\seq lsit .txt

Output Set: N:\CRF4\04112003\I701747A.raw

```

58 cctggagatc atgctagaca tccagcagga ggaataccta cccatatgga gggagacaaa 1020
59 tgagacatca ttcgaggcag ggatccgggt gcagatccac agccaggagg agcctcccta 1080
60 catccaccag ctgggggttcg gtgtgtcccc aggcttccag acttttgtgt cctgccagga 1140
61 acagcggcta acttatctgc cccagccttg gggcaactgc cgggcggaaa gcaagctcag 1200
62 ggagcctgag cttcaggggt actcagccta tagtgtgtct gcctgccgac tgcgctgtga 1260
63 gaaggaggcc gtgcttcagc gctgccactg ccggatggtg cacatgccag gcaatgagac 1320
64 catctgcccg ccaaatactt acattgaatg tgccgaccac acactggact ccctgggtgg 1380
65 gggctctgag ggcccatgct tctgccctac accctgcaac ctgactcggt acggcaaga 1440
66 gatctccatg gtcaagatcc ccaacagggg ctctgccagg tacctggcga ggaagtacaa 1500
67 ccgcaatgag acctacataa gggaaaactt cttggtcctg gatgtcttct ttgaggccct 1560
68 aacctctgaa gccatggaac agcgagctgc ctatggtctg tcagccttgc tgggggacct 1620
69 tgggggacag atgggctgt tcatggggc tagcatctc accttgctgg agatccttga 1680
70 ctacatctat gaggtctct gggatcgact caagagggtg tggcgacggc ccaagacccc 1740
71 acttaggacg tccactgggg gcatctccac tttggggctg caggaaactga aggaacagag 1800
72 tccctgtcca aatcgaggcc gtgctgaggg tgggtggggt agcaacctgc ttcccaacca 1860
73 tcaccacccc cagggccccc caggaagcct ctttgaaaac tttgcttgc aggatgggtg 1920
74 tgtgtgggga aagtacccat gaaaccccac actctcctat tcttgggaca gaaggtctgg 1980
75 ggcagcccag ggctaaggga aggggtggtg ctactgaaa ggccaggact aggttcctgc 2040
76 tctccctgac ctaggctcag ctgecttgca caagaatcct tcttgtccat actccctgct 2100
W--> 77 cccaggcagg tgtccaggaa gggctagaga ccggactang agggccctga ggaggggagg 2160
W--> 78 gatgaagaga gggaggaagg cggaaccatg gtagagcccc tcngtacatt tgtatatatt 2220
W--> 79 tagggactgg gtgggggtgg gacacagaca tanaagggtt gggctgcagg ggagggtgac 2280
W--> 80 acaggatagt cagggtccca accctaattg canaangcaa ctccttggga cctaggcatg 2340
81 ttgggctggt tctacttccc tctttccagg cccagctccc tcttggcatg gggagtgggt 2400
W--> 82 ggcccatcag gcctggccca gctcccantt cccctgtac cagccccacc acaagttccc 2460
W--> 83 ttctgtggga gtgggtggaa anacctttca gaccttggct aagcttatgg ggaganggag 2520
W--> 84 tggccttctc angccttgcct ccctanagac tggttttata aantgctggt gaacttggga 2580
W--> 85 atcnagagac cccnagaaaa aaaaaaaaaa aaaaaaaaaa aa 2622

```

88 <210> SEQ ID NO: 2

89 <211> LENGTH: 539

90 <212> TYPE: PRT

91 <213> ORGANISM: Rattus norvegicus

93 <400> SEQUENCE: 2

```

94 Met Pro Ile Glu Ile Val Cys Lys Ile Lys Phe Ala Glu Glu Asp Ala
95   1           5           10           15
97 Lys Pro Lys Glu Lys Glu Ala Gly Asp Glu Gln Ser Leu Leu Gly Ala
98           20           25           30
100 Ala Gln Gly Pro Ala Ala Pro Arg Asp Leu Ala Thr Phe Ala Ser Thr
101           35           40           45
103 Ser Thr Leu His Gly Leu Gly Arg Ala Cys Gly Pro Gly Pro His Gly
104           50           55           60
106 Leu Arg Arg Thr Leu Trp Val Leu Ala Leu Leu Thr Ser Leu Ala Ala
107   65           70           75           80
109 Phe Leu Tyr Gln Ala Ala Ser Leu Ala Arg Gly Tyr Leu Thr Arg Pro
110           85           90           95
112 His Leu Val Ala Met Asp Pro Ala Ala Pro Ala Pro Val Ala Gly Phe
113           100          105          110
115 Pro Ala Val Thr Leu Cys Asn Ile Asn Arg Phe Arg His Ser Ala Leu
116           115          120          125

```

RAW SEQUENCE LISTING

DATE: 04/11/2003

PATENT APPLICATION: US/09/701,747A

TIME: 09:42:30

Input Set : A:\seq lsit .txt

Output Set: N:\CRF4\04112003\I701747A.raw

```

118 Ser Asp Ala Asp Ile Phe His Leu Ala Asn Leu Thr Gly Leu Pro Pro
119      130      135      140
121 Lys Asp Arg Asp Gly His Arg Ala Ala Gly Leu Arg Tyr Pro Glu Pro
122 145      150      155      160
124 Asp Met Val Asp Ile Leu Asn Arg Thr Gly His Gln Leu Ala Asp Met
125      165      170      175
127 Leu Lys Ser Cys Asn Phe Ser Gly His His Cys Ser Ala Ser Asn Phe
128      180      185      190
130 Ser Val Val Tyr Thr Arg Tyr Gly Lys Cys Tyr Thr Phe Asn Ala Asp
131      195      200      205
133 Pro Gln Ser Ser Leu Pro Ser Arg Ala Gly Gly Met Gly Ser Gly Leu
134      210      215      220
136 Glu Ile Met Leu Asp Ile Gln Gln Glu Glu Tyr Leu Pro Ile Trp Arg
137 225      230      235      240
139 Glu Thr Asn Glu Thr Ser Phe Glu Ala Gly Ile Arg Val Gln Ile His
140      245      250      255
142 Ser Gln Glu Glu Pro Pro Tyr Ile His Gln Leu Gly Phe Gly Val Ser
143      260      265      270
145 Pro Gly Phe Gln Thr Phe Val Ser Cys Gln Glu Gln Arg Leu Thr Tyr
146      275      280      285
148 Leu Pro Gln Pro Trp Gly Asn Cys Arg Ala Glu Ser Lys Leu Arg Glu
149      290      295      300
151 Pro Glu Leu Gln Gly Tyr Ser Ala Tyr Ser Val Ser Ala Cys Arg Leu
152 305      310      315      320
154 Arg Cys Glu Lys Glu Ala Val Leu Gln Arg Cys His Cys Arg Met Val
155      325      330      335
157 His Met Pro Gly Asn Glu Thr Ile Cys Pro Pro Asn Ile Tyr Ile Glu
158      340      345      350
160 Cys Ala Asp His Thr Leu Asp Ser Leu Gly Gly Gly Ser Glu Gly Pro
161      355      360      365
163 Cys Phe Cys Pro Thr Pro Cys Asn Leu Thr Arg Tyr Gly Lys Glu Ile
164      370      375      380
166 Ser Met Val Lys Ile Pro Asn Arg Gly Ser Ala Arg Tyr Leu Ala Arg
167 385      390      395      400
169 Lys Tyr Asn Arg Asn Glu Thr Tyr Ile Arg Glu Asn Phe Leu Val Leu
170      405      410      415
172 Asp Val Phe Phe Glu Ala Leu Thr Ser Glu Ala Met Glu Gln Arg Ala
173      420      425      430
175 Ala Tyr Gly Leu Ser Ala Leu Leu Gly Asp Leu Gly Gly Gln Met Gly
176      435      440      445
178 Leu Phe Ile Gly Ala Ser Ile Leu Thr Leu Leu Glu Ile Leu Asp Tyr
179      450      455      460
181 Ile Tyr Glu Val Ser Trp Asp Arg Leu Lys Arg Val Trp Arg Arg Pro
182 465      470      475      480
184 Lys Thr Pro Leu Arg Thr Ser Thr Gly Gly Ile Ser Thr Leu Gly Leu
185      485      490      495
187 Gln Glu Leu Lys Glu Gln Ser Pro Cys Pro Asn Arg Gly Arg Ala Glu
188      500      505      510
190 Gly Gly Gly Ala Ser Asn Leu Leu Pro Asn His His His Pro His Gly

```

RAW SEQUENCE LISTING

DATE: 04/11/2003

PATENT APPLICATION: US/09/701,747A

TIME: 09:42:30

Input Set : A:\seq lsit .txt

Output Set: N:\CRF4\04112003\I701747A.raw

```

191          515          520          525
193 Pro Pro Gly Ser Leu Phe Glu Asn Phe Ala Cys
194          530          535
198 <210> SEQ ID NO: 3
199 <211> LENGTH: 526
200 <212> TYPE: PRT
201 <213> ORGANISM: Rattus norvegicus
203 <400> SEQUENCE: 3
204 Met Glu Leu Lys Thr Glu Glu Glu Glu Val Gly Gly Val Gln Pro Val
205 1 5 10 15
207 Ser Ile Gln Ala Phe Ala Ser Ser Ser Thr Leu His Gly Leu Ala His
208 20 25 30
210 Ile Phe Ser Tyr Glu Arg Leu Ser Leu Lys Arg Ala Leu Trp Ala Leu
211 35 40 45
213 Cys Phe Leu Gly Ser Leu Ala Val Leu Leu Cys Val Cys Thr Glu Arg
214 50 55 60
216 Val Gln Tyr Tyr Phe Cys Tyr His His Val Thr Lys Leu Asp Glu Val
217 65 70 75 80
219 Ala Ala Ser Gln Leu Thr Phe Pro Ala Val Thr Leu Cys Asn Leu Asn
220 85 90 95
222 Glu Phe Arg Phe Ser Gln Val Ser Lys Asn Asp Leu Tyr His Ala Gly
223 100 105 110
225 Glu Leu Leu Ala Leu Leu Asn Asn Arg Tyr Glu Ile Pro Asp Thr Gln
226 115 120 125
228 Met Ala Asp Glu Lys Gln Leu Glu Ile Leu Gln Asp Lys Ala Asn Phe
229 130 135 140
231 Arg Ser Phe Lys Pro Lys Pro Phe Asn Met Arg Glu Phe Tyr Asp Arg
232 145 150 155 160
234 Ala Gly His Asp Ile Arg Asp Met Leu Leu Ser Cys His Phe Arg Gly
235 165 170 175
237 Glu Ala Cys Ser Ala Glu Asp Phe Lys Val Val Phe Thr Arg Tyr Gly
238 180 185 190
240 Lys Cys Tyr Thr Phe Asn Ser Gly Gln Asp Gly Arg Pro Arg Leu Lys
241 195 200 205
243 Thr Met Lys Gly Gly Thr Gly Asn Gly Leu Glu Ile Met Leu Asp Ile
244 210 215 220
246 Gln Gln Asp Glu Tyr Leu Pro Val Trp Gly Glu Thr Asp Glu Thr Ser
247 225 230 235 240
249 Phe Glu Ala Gly Ile Lys Val Gln Ile His Ser Gln Asp Glu Pro Pro
250 245 250 255
252 Phe Ile Asp Gln Leu Gly Phe Gly Val Ala Pro Gly Phe Gln Thr Phe
253 260 265 270
255 Val Ser Cys Gln Glu Gln Arg Leu Ile Tyr Leu Pro Ser Pro Trp Gly
256 275 280 285
258 Thr Cys Asn Ala Val Thr Met Asp Ser Asp Phe Phe Asp Ser Tyr Ser
259 290 295 300
261 Ile Thr Ala Cys Arg Ile Asp Cys Glu Thr Arg Tyr Leu Val Glu Asn
262 305 310 315 320
264 Cys Asn Cys Arg Met Val His Met Pro Gly Asp Ala Pro Tyr Cys Thr

```

RAW SEQUENCE LISTING

DATE: 04/11/2003

PATENT APPLICATION: US/09/701,747A

TIME: 09:42:30

Input Set : A:\seq lsit .txt

Output Set: N:\CRF4\04112003\I701747A.raw

```

265          325          330          335
267 Pro Glu Gln Tyr Lys Glu Cys Ala Asp Pro Ala Leu Asp Phe Leu Val
268          340          345          350
270 Glu Lys Asp Gln Glu Tyr Cys Val Cys Glu Met Pro Cys Asn Leu Thr
271          355          360          365
273 Arg Tyr Gly Lys Glu Leu Ser Met Val Lys Ile Pro Ser Lys Ala Ser
274          370          375          380
276 Ala Lys Tyr Leu Ala Lys Lys Phe Asn Lys Ser Glu Gln Tyr Ile Gly
277 385          390          395          400
279 Glu Asn Ile Leu Val Leu Asp Ile Phe Phe Glu Val Leu Asn Tyr Glu
280          405          410          415
282 Thr Ile Glu Gln Lys Lys Ala Tyr Glu Ile Ala Gly Leu Leu Gly Asp
283          420          425          430
285 Ile Gly Gly Gln Met Gly Leu Phe Ile Gly Ala Ser Ile Leu Thr Val
286          435          440          445
288 Leu Glu Leu Phe Asp Tyr Ala Tyr Glu Val Ile Lys His Arg Leu Cys
289          450          455          460
291 Arg Arg Gly Lys Cys Gln Lys Glu Ala Lys Arg Ser Ser Ala Asp Lys
292 465          470          475          480
294 Gly Val Ala Leu Ser Leu Asp Asp Val Lys Arg His Asn Pro Cys Glu
295          485          490          495
297 Ser Leu Arg Gly His Pro Ala Gly Met Thr Tyr Ala Ala Asn Ile Leu
298          500          505          510
300 Pro His His Pro Ala Arg Gly Thr Phe Glu Asp Phe Thr Cys
301          515          520          525

```

305 <210> SEQ ID NO: 4

306 <211> LENGTH: 26

307 <212> TYPE: DNA

308 <213> ORGANISM: Rattus norvegicus

310 <400> SEQUENCE: 4

311 tagcagtgag gctctggcca gtccca

26

314 <210> SEQ ID NO: 5

315 <211> LENGTH: 25

316 <212> TYPE: DNA

317 <213> ORGANISM: Rattus norvegicus

319 <400> SEQUENCE: 5

320 ccagaccttc tgtcccagga atagg

25

323 <210> SEQ ID NO: 6

324 <211> LENGTH: 25

325 <212> TYPE: DNA

326 <213> ORGANISM: Rattus norvegicus

328 <400> SEQUENCE: 6

329 gacctggcta cctttgccag cacca

25

332 <210> SEQ ID NO: 7

333 <211> LENGTH: 25

334 <212> TYPE: DNA

335 <213> ORGANISM: Rattus norvegicus

337 <400> SEQUENCE: 7

338 atatgggtag gtattcctcc tgctg

25

RAW SEQUENCE LISTING ERROR SUMMARY
PATENT APPLICATION: US/09/701,747A

DATE: 04/11/2003
TIME: 09:42:31

Input Set : A:\seq lsit .txt
Output Set: N:\CRF4\04112003\I701747A.raw

Please Note:

Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:1; N Pos. 213⁹, 220³, 225³, 231³, 231⁶, 242⁸, 248², 251⁶, 253², 254⁶, 256³, 258⁴
Seq#:1; N Pos. 25⁹₄
Seq#:8; N Pos. 3, 9, 18, 21
Seq#:9; N Pos. 1, 4, 7, 10, 16, 19
Seq#:10; Xaa Pos. 3, 6
Seq#:11; Xaa Pos. 8

VERIFICATION SUMMARY

DATE: 04/11/2003

PATENT APPLICATION: US/09/701,747A

TIME: 09:42:31

Input Set : A:\seq lsit .txt

Output Set: N:\CRF4\04112003\I701747A.raw

L:77 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2100
L:78 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2160
L:79 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2220
L:80 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2280
L:82 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2400
L:83 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2460
L:84 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2520
L:85 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:1 after pos.:2580
L:352 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:8 after pos.:0
L:366 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9 after pos.:0
L:385 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:10 after pos.:0
L:401 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:11 after pos.:0